<table>
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<th>CONCEPT</th>
<th>DEFINITION</th>
<th>EFFECTS OF INCREASE</th>
<th>EFFECTS OF DECREASE</th>
<th>WHAT AFFECTS IT</th>
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</table>
| CONTRACTILITY | A measure of intrinsic strength of ventricular muscle; *will change elastance* b/c it represents a change in myocardial function (ie, expect the slope of ESPVR to change) | -EDV decreases slightly                      
-ESV decreases → SV increases  
→ CO increases  
-slope of ESPVR increases,  
slope of EDPVR stays same  
-DBP and SBP increase | -EDV increases slightly                      
-ESV increases → SV decreases  
→ CO decreases  
-slope of ESPVR decreases,  
slope of EDPVR stays same  
DBP and SBP both decrease | 1. amount of Ca²⁺ (increase will increase contractility  
eg: β-agonists (e.g epinephrine and norepinephrine), Ca²⁺, phosphodiesterase inhibitors, increase Ca²⁺ conc, so contractility increases  
eg: β-antagonists, Ca²⁺ channel blockers, reduce Ca²⁺ conc.  
2. affinity of myofilaments for Ca²⁺ regarding excitation/contraction coupling  
3. change in the number of muscle cells, ie an MI decreases contractility  
4. asynchrony of contraction – eg bundle branch block, ventricular fibrillation |
|              |                                                                             | What it means to increase contractility  
the ventricles will be stiffer at the end systole because they can contract more forcefully, so more blood can be ejected → ejection fraction increases,  
implies that afterload is decreased (doesn’t affect EDV much)   | What it means to decrease contractility  
the ventricular muscle cannot eject blood as forcefully, so less blood is ejected → ejection fraction decreases,  
implies that afterload is increased (also doesn’t affect EDV much)   |                                                                                      |
| PRELOAD      | The load or stretch on the myocardial wall *right before* contraction (aka EDV or filling pressure)  
-can be measured by EDP, or estimated by atrial pressure | -EDV increases                      
-ESV increases slightly → SV incr.  
→ CO increases  
-slope of ESPVR stays same  
-slope of EDPVR stays same  
-DBP and SBP both increase | -EDV decreases                      
-ESV decreases slightly → SV decreases  
→ CO decreases  
-slope of ESPVR stays same  
-slope of EDPVR stays same  
-DBP and SBP both decrease | 1. intravascular volume  
2. venous tone  
3. ventricular compliance  
4. the pericardium  
5. atrial activity |
|              |                                                                             | What it means to increase preload  
If the stretch on the myocardial wall is increased before contraction,  
the amount of blood being ejected will increase | What it means to decrease preload  
Decreasing the load on the heart before contraction will result in decreased blood being ejected |                                                                                      |
| AFTERLOAD | the load imposed on the heart during ejection; ie, the pressures the heart must overcome to eject blood | -EDV increases slightly  
-ESV increases  
→ SV decreases  
→ CO decreases  
-Ees stays same  
-DBP and SBP both increase | -EDV decreases slightly  
-ESV decreases  
→ SV increases  
→ CO increases  
-Ees stays same  
-DBP and SBP both decrease | -imposed on heart by arterial system:  
1. aortic impedance  
2. total peripheral resistance (TPR)  
3. wall stress  
4. aortic blood pressure  
5. aortic valve if stenotic |
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<tbody>
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<td>What it means to increase afterload if afterload is increased, the heart must work harder to pump the same amount of blood – eg, increasing TPR will make it more difficult</td>
<td>What it means to decrease afterload Decreasing the pressure the heart must overcome will make it easier for the heart to eject the same amount of blood</td>
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<th>COMPLIANCE</th>
<th>Describes how the volume of blood (in a vessel or chamber) changes for a given change in pressure ( C = \frac{V}{P} ). Since the EDPVR is not linear, technically diastolic compliance decreases at high preload volumes. In other words, at high volumes, it requires a much greater increase in filling pressure to bring about a unit change in volume. The term compliance is used more loosely to convey the overall characteristics of the ventricle in diastole; this is reflected by the position of the EDPVR curve.</th>
<th>If something causes the ventricle to be “more compliant” it means the EDPVR shifts down and to the right. This means that for the same filling pressure, the EDV will be increased, SV will increase (Starling mechanism).</th>
<th>If something causes the ventricle to be “less compliant” it means the EDPVR shifts up and to the left. This means that for the same filling pressure, the EDV will be decreased, SV will decrease (Starling mechanism).</th>
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| 1. Pericardium. Effusion (excess fluid in the pericardial space) will decrease diastolic compliance and shift the EDPVR curve.  
2. Ischemia may not allow the muscle to fully relax (actin-myosin dissociation is also ATP dependent)  
3. Certain types of chronic heart failure (diastolic dysfunction) are associated with increased fibrous connective tissue and decreased compliance;  
4. Chronic diseases and/or stresses may lead to ventricular dilatation. This allows the ventricle to contain higher volumes. | --- | --- | --- |